

CISE NEXT GENERATION SOFTWARE (NGS) PROGRAM

Program Announcement (NSF 99-8)

**DIRECTORATE FOR
COMPUTER AND INFORMATION SCIENCE AND ENGINEERING**

DEADLINE DATE: JANUARY 12, 1999

**Next Generation Software (NGS)
(Replaces the Challenges in CISE Program)**



NATIONAL SCIENCE FOUNDATION

The Experimental and Integrative Activities Division in the Computer and Information Science and Engineering (CISE) Directorate announces a new thrust: the **Next Generation Software** (NGS) to support multidisciplinary (group-oriented as well as single investigator) research, commencing in Fiscal Year 1999.

The NGS program fosters multidisciplinary software research under two components: **Technology for Performance Engineered Systems** (TPES), and **Complex Application Design and Support Systems** (CADSS). The overall thrust of NGS will be research and development for new software technologies integrated across the systems' architectural layers, and supporting the design and the operation cycle of applications, computing and communications systems, and delivering quality of service (QoS). The **TPES** component will support research for methods and tools leading to the development of performance frameworks for modeling, measurement, analysis, evaluation and prediction of performance of complex computing and communications systems, and of the applications executing on such systems. The **CADSS** component will support research on novel software for the development and run-time support of complex applications executing on complex computing platforms; CADSS fostered technology breaks down traditional barriers in existing software components in the application development, support and runtime layers, and will leverage TPES developed technology for delivering QoS.

It's expected that technology developed under TPES, when integrated into the design process, will lead to substantial decreases in the development time and cost of future advanced information systems, from the hardware components to the applications executing on such platforms. In addition such capabilities, when integrated into the operational process of these systems, as envisioned with CADSS, will

lower the cost of their management, optimize their performance, and ensure QoS.

The technologies developed will be validated with demonstrations on important national interest applications. Multidisciplinary teams will involve collaboration among researchers in several areas in computer sciences **and** application developers.

Background

New and future computing platforms and applications are far more advanced, powerful, dynamic and complex than in the past. Such platforms include both the globally-distributed, meta-computing, heterogeneous, networked, and adaptive platforms, ranging from assemblies of networked workstations, to networked supercomputing clusters or combinations thereof (**Grids**), as well as the more tightly coupled future petaflops platforms, which will be enabled as grids-in-a-box (**GiBs**).

Such complexity requires new systems' software technology for the design, development, run-time support, maintenance and management of the applications and their platforms. The new software technologies need to adopt a more integrated view of the architectural layers and software components of a computing system, consisting of: the applications, the application support environments (languages, compilers, application libraries, linker, run-time support, security, visualization, etc.), operating system (scheduling, resource allocation and management, etc), computing platform architectures, processing nodes and network layers.

Present software technologies supporting the design and operation of computing systems and applications treat individual layers and components in an isolated fashion. This approach had been reasonably successful when the computing systems and the applications were relatively simple. However such

approaches are inadequate in supporting the emerging complex applications and computing platforms.

The research to be fostered under the present initiative is intended to lead to more integrated software environments eliminating boundaries between the different components and layers, and create capabilities that provide a **system** view and management ability.

Research Scope

Overview

The **TPES** component will support research for developing methods, tools and performance frameworks to analyze and predict behavior of the entire computing system and of multiple views of the computing system.

This research will be enabled by creating performance frameworks capable of using models (in a plug-and-play fashion) of different levels of detail of each component and layer, as needed for the specific analysis at hand. Significant advancements are needed in the current methods and tools, to measure, model and analyze computing systems at all levels - from the application level, to the software level, to the hardware levels.

Major technical challenges include: the development of multilevel modeling and simulation methods and tools (application level, system software, and hardware levels, including the network levels), hierarchical or multiscale approaches (models of multiple levels of abstraction and resolution for components at each level), and scalable approaches for modeling the behavior of the entire system, or for analysing the behavior at each level as affected by the behavior of components in the other levels; modeling of how the behavior of system components or the system scales as one shifts from a small prototype to the larger (production or future) machine, or to a machine where some of the architectural features change. The present initiative seeks methods and tools

that are general and powerful enough to be applicable for both globally distributed systems as well as high-end petaflops-class systems.

The **CADSS** component will support research on software technologies for the development and runtime support of complex applications which execute on globally distributed as well as on the planned petaflops platforms.

The research and technology to be developed encompasses the following: new programming models; new compiler technology, where part of the compiler becomes embedded in the runtime, and where the compiler interacts with the system resource manager and performance models of the underlying hardware and software (such as the models developed by the TPES program component above) for optimizing the mapping of the application on the underlying platform assembly; knowledge based technology for application components' assembly; integration of these technologies into an application support environment, and demonstration of these technologies on important national interest applications, including advanced networking applications.

TPES Motivation and Research Agenda

Advanced computing systems will be attained by assemblies of globally distributed, heterogeneous, networked systems, embodying high-end platforms consisting of heterogeneous processing nodes, and complex memory hierarchies. Many factors affect the performance of such complex systems and the applications executing on them. These include the computer and network architecture, the system software components and the end-user applications. There exists an array of isolated modeling and simulation methods and tools used to understand the behavior of isolated components of these systems, from analytical and queuing models, to tracing tools, simulators and emulators. However the present methods do not have the capability to provide a system view and analysis, nor they can provide a well-defined

hierarchical analysis and structuring needed to model systems of the level of complexity under consideration.

The TPES component in this competition seeks proposals for multidisciplinary research on the development of methods and tools for a layered, multilevel, scalable performance engineering capability, spanning applications, systems software and hardware, and developing performance methodologies that have predictive as well as evaluation capabilities. In particular we are interested in: methods which provide hierarchical or multilevel analysis of such systems, enable assessment of the effects of individual hardware and software layers and components of these systems, as well as pluggable into the performance frameworks to assess their impact on the performance of the entire system. Various approaches to developing tools that implement such modeling methods will be pursued.

The development of such capabilities requires advances in the following areas:

- Methods for modeling and simulation of the behavior of the application and system components at multiple levels of detail and abstraction.
- Modeling languages for application and system description and modeling, and specification of performance attributes.
- Interfaces that allow models and simulators with different resolution levels to be combined together as needed into performance frameworks to analyze system behavior.
- New instrumentation methods, measurement tools, methods of combining measurements of different levels of resolution and time scales.
- Integration of the technologies above into performance frameworks.

Proposals should include plans to demonstrate the validity of technologies developed above by applying them on important platforms and applications.

CADDs Motivation and Research Agenda

Modern applications consist of multiple inter-operating compute- and data-intensive components. To obtain accurate models and simulations or to deliver real-time results, the applications need to execute on high-performance globally distributed and high-end petaflops-class computing platforms. At the same time these applications need to achieve high-efficiency and QoS when executing on such platforms.

The present methods of building applications result in applications that are designed for a given platform. When the platform changes, the application needs to be rewritten for a new platform. This is costly and limiting: the resulting applications cannot automatically move to the new platform; the applications cannot be distributed to run concurrently on the old and the new platforms; the applications cannot be dynamically partitioned across globally distributed platform assemblies, map dynamically across such platforms as the resource availability changes, and exploit such platform assemblies with quality-of-service. Similar obstacles exist when the problem size changes, and the application needs for example to be repartitioned and remapped for the bigger problem size. Today's technology necessitates considerable and laborious hand tuning.

Effective use of distributed computing platforms requires automating the process of distributing and mapping the application across such platforms, as well as optimizing the mapping of the application on a given high-end platform. Such automation will require a new generation of compiling technology, which will create compiling systems that extend into the run-time and can dynamically invoke operating systems services, and use performance models of the

software and the hardware to dynamically optimize the application mapping across the heterogeneous platform assembly.

In addition, novel approaches and substantial enhancements are needed in computational models used to express the distributed applications and enhance the compiler's ability to: analyze task and data dependencies in the application programs, resolve dependencies, and optimize mapping across a complex memory structure of distributed (Grids or GiBs) platforms with multiple levels of memory hierarchy.

Executing applications on heterogeneous platforms also requires the runtime system to have the ability to dynamically select appropriate application components suitable for each one of the kinds of platforms in the heterogeneous platform ensemble or the problem size. The new compiling technology will be aware of the issues of heterogeneity in the underlying architecture of each of the platforms, such as differing memory organization, machine accuracy, data conversion problems, and link to appropriately selected components to generate consistent code at runtime.

Additional technologies required are: tools for debugging distributed applications; methods and tools to model the features and behavior of components of the system (such as for example that will be developed under TPES); and making these models and tools accessible and available to the compiler for optimizing the mapping of the application.

The CADSS component in this competition will develop technology to support the development and the runtime of complex applications executing on globally distributed or high-end, petaflops-class platforms, and will allow adapting the mapping of the applications dynamically as the underlying resources change or as the application needs change. To create such capabilities requires technical advances to:

- Develop a distributed programming model which will facilitate the compiler to distribute the application across distributed, heterogeneous, complex computing platforms. This model can be an appropriate extension of existing models.
- Create a new generation of compiling technology for such platforms, encompassing:
 - embedding a portion of the compiler in the runtime system and enabling of the compiler to interface with the underlying systems' linkers and resource managers to determine system resources' availability;
 - capability by the compiler to interface and use underlying system models for optimizing application mapping and scheduling;
 - techniques for determining functional and data dependencies across distributed platforms and multiple levels of memory hierarchy; and
 - ability of the compiler to interface with the application composition systems described below and dynamically select the appropriate components at run-time.
- Create technology for building knowledge-based application composition systems :
 - develop methods for problem specification and content information extraction for automatically selecting such components;

- application interfaces and methods for problem specification and extracting content information;
 - ability to interface with the underlying computing platform models to determine suitable application components;
 - novel numerical and other component libraries, tolerant of sections of a computation done on heterogeneous platforms of differing accuracy and handling data conversion issues; ability to combine results from such heterogeneous computations;
 - development of appropriate application component libraries and interface with the run-time portion of the compiler to link to appropriate libraries; and
 - creation of knowledge bases for application components for specific test applications, for example applications relevant to NGI (Next Generation Internet).
- Develop new methods of instrumentation and measurement accessible to the compiler for application mapping, and for new debugging tools suitable for distributed applications.
 - Provide validation of key technologies developed above and integration of the individual technologies into an application design and support **system**.

Validation and Demonstration of the Technology

This competition will seek proposals for research addressing the challenges discussed above. This new software technology is a

deviation from the traditional development approaches, and will often require the cooperation of researchers in the areas of applications, languages and computational models, compilers, libraries and environments, performance modeling and tools, and computer architecture and networking. An integral part of the work is to demonstrate and validate the developed technology; therefore testing of the technology on important applications will be required. Furthermore, where appropriate, partnerships with industry are encouraged, as it is also important that any prototype technology developed under this program will lead to technology transition to industry.

Proposals should include plans to demonstrate the validity of technologies developed above by applying them on important platforms and applications.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

Proposals under this program announcement **MUST** be submitted via the NSF FastLane system, as described in a subsequent section.

Proposals submitted in response to this program announcement should be prepared and submitted in accordance with the general guidelines contained in the *Grant Proposal Guide* (GPG), NSF 99-2. In particular, page formatting requirements given on page 5 will be strictly enforced, and proposals not complying will be returned without review. The complete text of the GPG (including electronic forms) is available electronically on the NSF Web site at: <http://www.nsf.gov/>. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone 301.947.2722 or by e-mail from pubs@nsf.gov.

Proposers are reminded to identify the program announcement number (NSF 99-8) in the program announcement/solicitation block on the NSF Form 1207, *Cover Sheet for Proposal to*

the National Science Foundation. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

The following are exceptions to the general guidelines, specific to this activity, and must be added to the 15-page project description:

- each PI and Co-PI may use up to an additional 2 pages each to describe results under prior NSF support, focusing on those results relevant to the proposed project;
- milestones for the full period of the award;
- one-page management plan in the case of multi-investigator teams;
- one-page describing cost sharing, if any.

Proposals not conforming to these guidelines will be returned to the proposer without review.

B. Budgetary Information

The program expects to make awards that involve single investigator as well as multi-investigator teams, at levels in the range of \$200K to \$1M per year; particular circumstances may justify awards outside of this range. It is anticipated that most awards will be for three years, but longer periods will be considered if they are clearly required by the research proposed. About a dozen large projects and about twenty smaller projects are expected to receive support.

Assuming the availability of funds, CISE intends to conduct this competition on an annual basis. Pertinent information regarding subsequent competitions will be provided via a "Dear Colleague" letter early in each fiscal year.

Cost Sharing Requirements:

Cost sharing is encouraged but not mandatory. Cost sharing is not a

requirement and will not be used as a criterion in the review process.

The proposed cost sharing, if any, must be shown on line M on the proposal budget (NSF Form 1030).

The amount of cost sharing must be shown in the proposal in enough detail to allow NSF to determine its impact on the proposed project. Documentation of availability of cost sharing must be included in the proposal.

Only items which would be allowable under the applicable cost principles, if charged to the project, may be included as the grantee's contribution to cost sharing. Contributions may be made from any non-Federal source, including non-Federal grants or contracts, and may be cash or in-kind (see OMB Circular A-110, Section 23). It should be noted that contributions counted as cost-sharing toward projects of another Federal agency may not be counted towards meeting the specific cost-sharing requirements of the NSF grant.

All cost-sharing amounts are subject to audit. Failure to provide the level of cost-sharing reflected in the approved grant budget may result in termination of the NSF grant, disallowance of grant costs and/or refund of grant funds to NSF.

C. Proposal Due Dates

For the purposes of review logistics, we will appreciate a letter of intent, including a one-page abstract of the proposal and list of co-PI's and their institutions, to be submitted to NSF by 5:00pm, EST, **December 15, 1998, by e-mail to ngs-letr@nsf.gov**. Lack of a submission of letter of intent will not preclude submission of proposals, **nor will it be considered in lieu of full proposals**, but will be appreciated as it will allow expediting the review process.

Proposals under this program announcement **MUST** be submitted via the NSF FastLane system, as described in the section below.

The proposal **MUST** be submitted by 5:00 PM, local time, **January 12, 1999**. Copies of the signed proposal cover sheet must be submitted in accordance with the instructions identified below.

Submission of Signed Cover Sheets. For proposals submitted electronically via the NSF FastLane Project, the signed proposal Cover Sheet (NSF Form 1207) must be forwarded to the following address:

National Science Foundation
DIS-FastLane Cover Sheet
4201 Wilson Blvd.
Arlington, VA 22230

The deadline for submitting the Signed Cover Sheets is **January 19, 1999**. To be considered for an award the cover sheets must be:

1. received by NSF no later than **January 19, 1999**; or
2. postmarked no later than five (5) days prior to the deadline date; or
3. sent via commercial overnight mail no later than two (2) days prior to the deadline date.

A proposal may not be processed until the complete proposal (including signed Cover Sheet) has been received by NSF.

D. FastLane Requirements

The NSF FastLane system is available for electronic preparation and submission of a proposal through the Web at the FastLane Web site at <http://www.fastlane.nsf.gov>. The Sponsored Research Office (SRO or equivalent) must provide a FastLane Personal Identification Number (PIN) to each Principal Investigator (PI) to gain access to the FastLane "Proposal Preparation" application. PIs that have not

submitted a proposal to NSF in the past must contact their SRO to be added to the NSF PI database. This should be done as soon as the decision to prepare a proposal is made.

In order to use NSF FastLane to prepare and submit a proposal, the following are required:

Browser (must support multiple buttons and file upload)

- Netscape 3.0 or greater
- Microsoft Internet Explorer 4.0 or greater

PDF Reader (needed to view/print forms)

- Adobe Reader 3.0 or greater

PDF Generator (needed to create project description)

- Adobe Acrobat 3.01 or greater
- Aladdin Ghostscript 5.10 or greater

A list of registered institutions and the FastLane registration form are located on the FastLane Web page.

For the *Signed Cover Sheet submission*, the delivery address **must clearly identify the NSF announcement or solicitation number** under which the proposal is being submitted.

Proposal Review Information

A. Merit Review Criteria

Review of proposals submitted to NSF are solicited from peers with expertise in the substantive area of the proposed research or education project. These reviewers are selected by Program officers charged with the oversight of the review process. NSF invites the proposer to suggest, at the time of submission, the names of appropriate or inappropriate reviewers. Special care is taken to ensure that reviewers have no immediate and obvious conflicts with the proposer. Special efforts are made to recruit reviewers from non-academic institutions, minority serving institutions, adjacent

disciplines to that principally addressed in the proposal, etc.

Proposals will be reviewed against the following general merit review criteria established by the National Science Board, as described in GPG (NSF 99-2). Following each criterion are potential considerations that the reviewer may employ in the evaluation. These are suggestions and not all will apply to any given proposal. Each reviewer will be asked to address only those that are relevant to the proposal and for which he/she is qualified to make judgments.

What is the intellectual merit of the proposed activity?

How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of prior work.) To what extent does the proposed activity suggest and explore creative and original concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

What are the broader impacts of the proposed activity?

How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

Integration of Research and Education

One of the principal strategies in support of NSF's goals is to foster integration of research and education through the programs, projects

and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learner perspectives. PIs should address this issue in their proposal to provide reviewers with the information necessary to respond fully to both NSF merit review criteria. NSF staff will give it careful consideration in making funding decisions.

Integrating Diversity into NSF Program, Projects, and Activities

Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports. PIs should address this issue in their proposal to provide reviewers with the information necessary to respond fully to both NSF merit review criteria. NSF staff will give it careful consideration in making funding decisions.

Additional criteria specific to this Program

The following criteria that reflect the specific objectives of the NGS initiative will also be considered in proposal evaluation:

- Potential for general impact on the development of techniques, environments, or paradigms that will advance the software to support computing, information processing and communications systems;
- In the case of multi-investigator teams, the extent to which the group is integrated with a common focus;

- Degree to which educational activities that increase the participation and training of students and researchers are integrated into the proposal;
- If the research proposed involves a testbed, the extent to which that testbed advances understanding of computing, information processing and communications systems.

B. Merit Review Process and Associated Customer Service Standard

Most the proposals submitted to NSF are reviewed by mail review, panel review, or some combination of mail and panel review. Proposals submitted in response to this announcement will be reviewed by review panels, which will in addition use input from ad hoc reviews. Reviewed proposals that overlap related programs described below (in Section: Other Programs of Interest) will be referred to those activities for consideration.

All proposals are carefully reviewed by at least three other persons outside NSF who are experts in the particular field represented by the proposal. Reviewers will be asked to formulate a recommendation to either support or decline each proposal. A program officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation. In most cases, proposers will be contacted by the program officer after his or her recommendation to award or decline funding has been approved by his or her supervisor, the division director. This informal notification is not a guarantee of an eventual award. NSF will be able to tell applicants whether their proposals have been declined or recommended for funding within six months for 95 percent of proposals in this category. In those cases where a proposal is being considered for joint funding by separate divisions, directorates, or agencies, NSF will be able to notify applicants within nine months in 95 percent of

proposals. The time interval begins on the proposal deadline or target date or from the date of receipt, if deadlines or target dates are not used by the program. The interval ends when the division director accepts the program officer's recommendation.

In all cases, after final programmatic approval has been obtained, the recommendation then goes to the Division of Grants and Agreements for review of business, financial and policy implications and the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with an NSF program officer. A principal investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants Officer does so at its own risk.

Award Administration Information

A. Notification of the Award

The review process will be concluded around the end-of-February 1999, with awards anticipated to be made in April 1999.

Additional information may be required on some or all of the following topics prior to making an award:

- Plans for publicity, documentation, support and dissemination of software developed under the award;
- Institutional policy on software licensing and distribution;
- Plans for making results available to the broader community.

Notification of the award is made ***to the submitting organization*** by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will

be advised as promptly as possible by the cognizant NSF Program Division administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator.

B. Grant Award Conditions

An NSF grant consists of: (1) the award letter, which includes any special provisions applicable to the grant and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable grant conditions, such as Grant General Conditions (NSF GC-1)* or Federal Demonstration Partnership Phase III (FDP) Terms and Conditions* and (5) any NSF brochure, program guide, announcement or other NSF issuance that may be incorporated by reference in the award letter. Electronic mail notification is the preferred way to transmit NSF grants to organizations that have electronic mail capabilities and have requested such notification from the Division of Grants and Agreements.

* These documents may be accessed electronically on NSF's Web site at: <http://www.nsf.gov/>. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone 301.947.2722 or by e-mail from pubs@nsf.gov.

Cooperative agreement awards also are administered in accordance with NSF Cooperative Agreement Terms and Conditions (CA-1). More comprehensive information on NSF Award Conditions is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, (NSF 95-26) available electronically on the NSF Web site. The GPM also is available in paper copy by subscription from the Superintendent of Documents, Government Printing Office, Washington, DC 20402. The GPM may be

ordered through the GPO Web site at:

<http://www.gpo.gov>.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the PI must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period.

Within 90 days after expiration of a grant, the PI also is required to submit a final project report. Approximately 30 days before expiration, NSF will send a notice to remind the PI of the requirement to file the final project report. Failure to provide final technical reports delays NSF review and processing of pending proposals for that PI. PIs should examine the formats of the required reports in advance to assure availability of required data.

NSF has implemented a new electronic project reporting system, available through FastLane, which permits electronic submission and updating of project reports, including information on: project participants (individual and organizational); activities and findings; publications; and, other specific products and contributions. Reports will continue to be required annually and after the expiration of the grant, but PIs will not need to re-enter information previously provided, either with the proposal or in earlier updates using the electronic system.

Effective October 1, 1998, PIs are required to use the new reporting format for annual and final project reports. PIs are strongly encouraged to submit reports electronically via FastLane. For those PIs who cannot access FastLane, paper copies of the new report formats may be obtained from the NSF Clearinghouse as specified above. NSF expects to require electronic submission of all annual and final project reports via FastLane beginning in October, 1999.

D. New Awardee Information

If the submitting organization has never received an NSF award, it is recommended that the organization's appropriate administrative officials become familiar with the policies and procedures in the *NSF Grant Policy Manual* which are applicable to most NSF awards. The Prospective New Awardee Guide (NSF 97-100) includes information on: Administration and Management Information; Accounting System Requirements and Auditing Information; and Payments to Organizations with Awards. This information will assist an organization in preparing documents that NSF requires to conduct administrative and financial reviews of an organization. The guide also serves as a means of highlighting the accountability requirements associated with Federal awards. This document is available electronically on NSF's Web site at:

<http://www.nsf.gov/cgi-bin/getpub?nsf97100>.

Contacts for Additional Information

Inquiries regarding technical aspects of the program should be made to: Dr. Frederica Darema, Senior Science and Technology Advisor and Director of the Next Generation Software Program; NSF, Room 1105; 4201 Wilson Blvd.; Arlington, VA 22230; e-mail: darema@nsf.gov; (703) 306-1981

An opportunity will exist at SC98 for a Q&A session on this program. Please see list of birds-of-a-feather (BOF) sessions at SC98 (<http://www.sc98.org>), for specific time for the BOF session. Additional forums for Q&A will be announced in a Dear Colleague letter.

Additional technical information related to the research directions fostered by this program announcement can be found in <http://www.cise.nsf.gov/eia/nsg>.

For questions related to use of FastLane, contact, Carolyn Miller, FastLane Project Officer, 703. 306.1145X4659, e-mail: cmiller@nsf.gov.

Other Programs of Interest

The opportunities described herein represent one, but not the only approach to support multidisciplinary research, and this solicitation is intended as a complement to those activities rather than a replacement. In particular, the following activities are closely related to this solicitation, and prospective proposers are urged to discuss their ideas with the contacts listed in order to determine the most appropriate programs for submission:

Experimental Activities

To complement research and education activities, the program supports the establishment and maintenance of CISE Advanced Distributed Resources for Experiments (CADRE). These are unique resources that, once established, can be accessed remotely by researchers around the country. Resources can be diverse, including, for example, hardware such as prototyping testbeds; software such as code libraries for experimental compiler research; repositories such as collections of human discourse data; and services such as brokers to bring together creators and users of educational materials. In addition the Experimental Partnerships component under the Experimental Activities Program provides opportunities in support of multidisciplinary, group-oriented research in topics that are within the domain of CISE programs. Experimental partnerships focus on a single problem, the solution of which requires scientific advances both in experimental computer science and engineering and in one or more partner disciplines within CISE.

Contact: Dr. Michael Foster, Division of EIA (703) 306-1936, mfoster@nsf.gov

Special Projects in Networking Research

This program differs from Networking Research by supporting larger and/or more multidisciplinary projects; specialized hardware/software or networks for networking

systems research; and mechanisms for developing research agendas and enhancing community development. Research projects supported by this program focus on networking issues and may include work from other disciplines of computer science and engineering - such as distributed systems, communications, operating systems, databases, software, signal processing, control theory and devices. Theoretical research activities address the next generation of networking and typically require small teams of researchers. Experimental research which demonstrates proofs of concept for novel networking ideas, may range in scope from laboratory experimentation to national collaborations.

Contact: Dr. Darleen Fisher, Division of ANIR (703) 306-1949, dlfisher@nsf.gov

In addition, the NSF Guide to Programs is a compilation of funding opportunities for research and education in science, mathematics, and engineering. General descriptions of NSF programs, research areas, and eligibility information for proposal submission are

provided in each chapter. Beginning in fiscal year 1999, the NSF Guide to Programs only will be available electronically (<http://www.nsf.gov/cgi-bin/getpub?gp>). Many NSF programs offer announcements concerning specific proposal requirements. To obtain additional information about these requirements, contact the appropriate NSF program offices listed in Appendix A of the GPG.

Any changes in NSF's fiscal year programs occurring after press time for the Guide to Programs will be announced in the NSF E-Bulletin, available electronically on the NSF Web site at: <http://www.nsf.gov/>. The direct URL for recent issues of the Bulletin is <http://www.nsf.gov/home/ebulletin/>. Subscribers can also sign up for NSF's Custom News Service to find out what funding opportunities are available.

ABOUT THE NATIONAL SCIENCE FOUNDATION

NSF funds research and education in most fields of science and engineering. Grantees are wholly responsible for conducting their project activities and preparing the results for publication. Thus, the Foundation does not assume responsibility for such findings or their interpretation.

NSF welcomes proposals on behalf of all qualified scientists, engineers and educators. The Foundation strongly encourages women, minorities and persons with disabilities to participate fully in its programs. In accordance with Federal statutes, regulations and NSF policies, no person on grounds of race, color, age, sex, national origin or disability shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NSF (some programs may have special requirements that limit eligibility).

Facilitation Awards for Scientists and Engineers with Disabilities provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. (For more information, see Section V.G.)

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 306-0090, FIRS at 1-800-877-8339.

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies needing information as part of the review process or in order to coordinate programs; and to another Federal agency, court or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," 63 *Federal Register* 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records," 63 *Federal Register* 268 (January 5, 1998). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding this burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to:

Mary Lou Higgs
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National Science Foundation
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YEAR 2000 REMINDER

In accordance with Important Notice No. 120 dated June 27, 1997, Subject: Year 2000 Computer Problem, NSF awardees are reminded of their responsibility to take appropriate actions to ensure that the NSF activity being supported is not adversely affected by the Year 2000 problem. Potentially affected items include: computer systems, databases, and equipment. The National Science Foundation should be notified if an awardee concludes that the Year 2000 will have a significant impact on its ability to carry out an NSF funded activity. Information concerning Year 2000 activities can be found on the NSF web site at <http://www.nsf.gov/oirm/y2k/start.htm>.

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